Lower Kabul River aquifer

Logar River aquifer

The capacities of these 4 aquifers available for the water supply of the city of Kabul are determined in the study as follows:

Upper Kabul River aquifer (UKRA)	34,200m3/d
Paghman (and Kharga) River aquifer	10,000m3/d
Lower Kabul River aquifer	10,000m3/d
Logar River aquifer	67,500m3/d
Total	121,700m3/d
equivalent to	44.4 Mm3/a

These capacities mark the limits, at the absence of recent data a probability of shortfall cannot be given.

At present, at the completion of the IAP, an extraction of 25 Mm3/a is expected. (in both cases including the production of Microroyan).

2.3.2 Production

On the three well fields, Logar, Allaudin and (new) Upper Kabula total of 26 new wells will be drilled and equipped, at capacities ranging between 125 and 175m3/h, rising the average and peak day capacities of the Kabul WS System to 121,000 and 171,000m3/d, respectively.

All wells are expected to have depth between 50 and 60m; they are fitted out with material of high standard for long lifetime and secure operation, have submersible motor pumps, the above-ground equipment is sheltered, the plots are walled as per the 'Logar-type' wells. At the same time, a total of 46km of well field collectors, of 26km of electricity supply lines, and of 15km of access roads are required.

The Lower Kabul aquifer (Microroyan system) and the Paghman aquifer (Afshar system) cannot sustain an extension of capacity, to the contrary, the Afshar system has to be downgraded to 10,500m3/d.

The quality of all of the water of the four main aquifers is still in accordance with WHO requirements; it is expected that this quality can be maintained in future provided the well filed protection areas are respected.

2.3.3 Pumping stations, reservoirs and trunks

The well fields are allocated to reservoirs in a way to minimise transport of water across the city. This principle notwithstanding, the Khair Khana supply areas must be allocated to the Logar resource replacing the weakening Paghman resource. The Upper Kabul well fields (existing Allaudin and new Upper Kabul) are allocated to the SW of Kabul. The Afshar System will be switched to the most westerly an upper supply areas.

Thus three new pumping stations are required at Logar, Upper Kabul and Afshar, respectively and the existing Bagrami and Allaudin pumping stations, respectively must be extended, as follows:

Logar I (Bagrami)	additional 2 x 250m3/h serving new Pai-e-Mena
	additional 2 x 250m3/h serving Ezzan Qemat
Logar II (new)	3 x 970m3/h serving all the areas N of As Abad and As Mayee hills and W of the airport road
Allaudin	additional 1 x 200m3/h
Upper Kabul (new)	2 x 262m3/h serving the SW,
	2 x 250m3/h serving the WSW
	2 x 220m3/h serving Chelseton and the right bank
Afshar high-lift	2 x 22m3/h serving extensions West
	2 x 150m3/h serving reservoir G together with the Kharga springs

Total additional pumping capacity is hence 6,314 m3/h. This is equivalent to 128,000m3/d of additional peak day capacity. All new pumping stations are equipped with maintenance-friendly horizontally split casing pumps, the existing stations with pumps of the already existing type due to the constraints of existing works. All new pumping stations are completely equipped with the required hydraulical and electrical control as well as surge control equipment. Redundant pumps are not provided for peak capacity. Stand-by power generation is not included but dealt with in one of the complementary projects.

Trunk mains are provided from the pumping stations to the respective reservoirs at a total length of 63km and at diameters ranging from DN300 to DN800 as required. Except for the reservoirs E and H, one reservoir, its trunk and the pertaining pumps form one distinct hydraulic system that can easily be controlled. All trunks are of ductile cast, cement mortar lined inside, having an equivalent outside coating, to the requirements of ISO 2531 and EN545. Where required, valves and other appurtenances are of PN exceeding PN10.

The existing main reservoirs A, C, F, G, H, O are all integrated in the project, new reservoirs viz.: D, E, I, R, S are required to cover the supply areas that cannot be served by the existing ones. Standard reservoirs are of 5,000m3, 2,500m3, and 750m3, respectively useful capacity and have two tanks each of half of the capacity.

Reservoirs capacity is taken at 30% of the average day production allocated to the reservoir's supply area. Since the project's capacity cannot satisfy the demand, reservoir capacities of the project are compared with those required at saturation of the supply areas and appropriate staging is provided. All reservoirs have bulk meters on the outlets to the distribution network and the usual control and maintenance elements.

2.3.4 Distribution network

The distribution network with diameters equal and below DN200 is increased from approx 450km by 925km to 1,375km and cover an area of 8,000ha with a total population of approx. 2.0 Mcap wherefrom 1.39 Mcap are served by house connections. Although in the existing network about 130km are of DN50 and less, all new local mains are od DN80 since the little price difference (just one or two Afs/m for the pipe) does not justify the considerable (2/3) loss of capacity. Mains of DN200 and more are of ductile cast iron with the usual automatic joints, mains of DN150 and less are of PE-HD with welded joints not requiring abutments. All valves are buried.

2.3.5 Service connections

House connections are connected with the standard material to mains of DN200 and less, larger principal mains are no more suitable for small consumer connections. House connections consist of a tapping saddle, corporate stop valve, buried, ¾"PEHD to the meter manhole, corporate stop valve in the manhole, ½" meter installed in a manhole of pre-cast concrete rings and concrete cover, ¾"PEHD to the meter manhole to the yard tap or the plumbing system of the house.

Outside above-ground installation of the meter, as practised elsewhere, is not possible because of the winter temperatures. Inside, above-ground installation of the meter is not possible due to the tradition of the country.

A standard public tap model has to be created when such installations become more numerous, however, this is subject to the climate and the institution that runs the taps

Fire hydrants have been installed in the past on major diameters. Fire hydrants are rarely placed or visible. If regulations of the City of Kabul regarding a fire brigade and the installation exist, this will influence the minimum diameter to be used for the secondary distribution network.

2.3.6 Envisaged accompanying measures

Technical assistance to the PIA is already a firm project undertaken by GTZ. Likewise, training measures are required to build up the required capacities with PIA's staff. An operational plan for such training measures has to be established and be implemented

by interested parties, e.g. NGO's who have already training capacities in Kabul and by others. Training may also take place overseas for superior staff.

Simultaneously with the implementation of the project a reform of the water sector is required to safeguard an orderly management of the scarce water resources and to resolve the imminent conflicts on water allocation. Likewise, GTZ is prepared to give assistance to the Government in this respect.

2.3.7 Complementary measures

The improvement of on-site sanitation and campaigns for hygiene awareness building have been a field of activity of several NGO's in the past. In the presence of a nightsoil system for excreta and the absence of an operating drainage system in Kabul (with the exception of the Microroyan and the other blocks of flats), the continuous improvement of on-site sanitation is required. This may require a strengthening of the nightsoil removal system and the construction of cess-pools on all plots for the removal of grey sewage. Both can be implemented in joint campaigns. Since the wwtp of the Microroyan system needs complete replacement in another complementary project, sewerage for limited commercial areas of the city (e.g. Old City, Share-Nau) is within reach.

Another complementary measure is the preferential treatment of the 4 principal stations and their well fields concerning power supply. This may require stand-by or continuous power generation for these stations and possibly a MV link between Logar and Upper Kabul.

2.4 Proof of Suitability

2.4.1 Technical suitability

The conception of the project is simple; no difficult processes not yet practised in the country are required. With respect to the size of the project and the post conflict situation, technical assistance is however a prerequisite for the successful technical implementation.

No particular technical risk for the achievement of the project result can be seen if the technical assistance can be conducted efficiently.

2.4.2 Economical suitability

Notwithstanding the simplicity of the processes and the closeness of the resources to the consumers which makes the project an economical one on the international scale, the low incomes of the potential consumers and the heaviness of the investments

- training
- campaigning
- hygienic on-site measures
- support in selected fields of O&M

2.5.3 Materials

Quality of material, in particular pipes and electro-mechanical equipment shall be in accordance with international standards. Locally produced material or material produced in neighbouring countries shall be accepted when fulfilling these standards. Close checks are required to ensure the quality of material produced in the region does not fall behind required quality standards.

2.5.4 The implementation schedule

Regarding the size of the project, an implementation period of 5 years is deemed to be realistic, beginning with the year 2004 and thus completing the project in late 2008. Assuming a speedy start, the year 2004 would see mainly design and tendering of the large works, the years 2005 and 2006 would see the most intense activities and expenditures because of the pumping stations, trunks and reservoirs, the years 2007 and 2008 would see much activity in the distribution networks. It is imperative to implement the works following the direction of flow of water and thus avoiding that completed distribution networks have to be kept non-operational until water is being made available by the late completion of headworks.

2.5.6 Packaging of project elements

As can be seen from item 4 hereinafter, because of its size, this short term project calls for the efforts of the whole of the international donor community. Consequently, the project is subdivided into small and medium-sized 'packages' ranging from 4MEUR up to 15MEUR, refer to table 6 on p.22. Apart from strict observation of the 'direction-of-flow-rule', the implementation with multiple partners requires a strict steering by the PIA and the availability of standard documents governing design, tendering, and construction of all kind of works that form part of the project, which must be established at the earliest possible. Failing to do so will inevitably result in an aggravated scenario for operation and maintenance.

2.5.7 Prerequisites for system operation

Although the technology used in the project is a simple and standard one, viz.: extraction of groundwater by deep wells equipped with easy-to-handle submersible motor pumps, chlorination with gaseous chlorine (if available), high-lift horizontally-split centrifugal pumps, comfortable subdivision into 13 reservoir supply areas, the O&M unit requires upgrading both in numbers and quality of staff and means, both for the commercial and the technical operation. This is referred to in item 3 hereinafter.

Another prerequisite for successful system operation is the availability of electricity on the well fields and pumping stations. The whole system – let alone the 'island' wells requires 13MVA and consumes 24GWh/a. This is referred to as complementary project under item 2.3.7 hereinabove.

The third prerequisite for system operation is the close monitoring not only of the well fields but of the complete hydrological system upstream of each aquifer. This aspect will be addressed under item 3 hereinafter.

3. Information on the Project Executing Agency (PEA)

3.1 The present institutional set-up

3.1.1 On Governmental level

The current Water Law was approved by the Senate Assembly on 17/1/1370 (Apr. 7, 1991) and defines the responsibilities of the ministries involved in the water sector, viz.: the Ministry of Water and Power, Ministry of Mines and Industry, the Ministry of Public Health, the Ministry of Agriculture. This however is soon going to be changed.

The Consultant is advised that the Interim Government is considering proposals for reform of the water sector. The present Ministry of Irrigation, Water Resources and Environment (MIWRE) (currently responsible for surface water resources) and the Ministry of Mines and Industry (MMI) (currently responsible for underground water resources) take the lead in this reform. It is expected that the overall responsibility for water resource management will be delegated to MIWRE. MIWRE together with Mmi will assess all water resources, consolidate information about all water resources and make the final determination about water resource allocation amongst all water using agencies following consultation.

Under the proposed reforms the Ministry of Water and Power (MPW), the Ministry of Agriculture and also the Ministry of Urban Development and Housing (MUDH) will be required to obtain approvals from MIWRE for specific schemes utilising water resources. The Consultant is advised by senior managers in the sector that the proposal is very likely to be accepted and that, in addition the Irrigation component of the MIWRE will be transferred to the Ministry of Agriculture and Forestry. By this, the earlier is likely to be consolidated into a Ministry of Environment, Mining and Natural Resources.

The anticipated improvements in coordination between the main water using agencies and MIWRE may also require changes in the legislation. The current National Development Plan - Working Draft, October 2002, for example is already serving as a guide to sector agencies preparing sector strategies and development plans.

3.1.2 On the PEA level: CAWSS

At present, the entity responsible for water supply to Afghan towns is CAWSS, rural water supply is not under her responsibility. CAWSS is established under the General Enterprise Law (approved 19/8/1369) and has the authority to act on her own responsibility within the policy defined by the High Council. At present, CAWSS is reporting to the MUDH.

The Headquarters Organisation of CAWSS headed by the President is comprised of the departments Planning, Engineering, Finance, Procurement, Personnel, Administration, Pipe Factory, and Workshop.

The Provincial City Water and Sanitation Departments and Kabul City Water Supply and Sanitation Department report to Headquarters in Kabul. Kabul City Water Supply and Sanitation Department (Operations) is comprised of six supply zones, plus the Afshar and Logar well fields. Each of the Kabul City supply zones and the well fields are, for the most part, currently financed and managed by international donors and NGO's, viz.: Supply Zones 1, 2, 3, Afshar (Project) and Logar (Project) by KfW through the Consultant, Supply Zones 4, 5, and 6 by CARE. Most of the functions in the central departments are not carried out to the extent required or not carried out at all.

In June, 2003, CAWSS reported to have 398 employees, of which 164 are non-technical staff.

3.2 An assessment of CAWSS's Situation

3.2.1 Institutional Capabilities

The Consultant has carried out an assessment of CAWSS' capacities in the second quarter of 2003. CAWSS is very weak in a significant number of important aspects of utility management. These (as well as some strength's), are based on interviews with CAWSS staff and derived from a more detailed analysis contained in the Annex 3.1 of DIR.

For purposes of analysis weaknesses (and strengths) have been divided into five specific categories covering

- Management capacity
- Commercial awareness
- Customer orientation
- Technical capacity
- Developing and maintaining staff

CAWSS's institutional capacity is considered to be weak in all these five key areas. This is concluded from the current absence of key activities, or limitations concerning these, defined in each of the above categories.

This situation is aggravated until now by the inadequate or outmodeled legal framework, a lack of coordination in the sanitation sector between CAWSS and the Municipality, the absence of suitable Urban Master plan for Kabul and a formal government policy for water supply and sewerage.

3.2.2 CAWSS's present financial status

CAWSS financial status has been strongly affected by the civil war, during which water supply was virtually non existing and during which the Authority was also non operational. Most documents prior to 1994 were "burnt"; and annual reports (balance sheet and income statement) have not been prepared after 1998. The customers' ledgers seem to be the only documents left from the pre-war period. However, there exists obviously some knowledge of accounting, as can be seen from the existence of accounts, held according to the national chart of accounts, and of a "main book", which is set up in the manner of an American Journal.

The latest balance sheets available in March 2003 were those for the end of the FY 21/03/1997 - 20/03/1998 (roughly 1997) and 21/03/1998 - 20/03/1999 (roughly 1998). Under the influence of the Immediate Assistance Project, the official balance sheet for FY 1999 and the unofficial and provisional one for FY 2000, were also prepared. These balance sheets, converted and summarised give a very low value for the fixed assets and Social Capital. The low level of cost coverage requires increasing subsidies. So, CAWSS is not over indebted and liabilities exist mainly towards the personnel. Receivables from customers could certainly not be stated at their full extent.

As it is Kabul water supply which is interesting here, and since pertinent information from the provincial towns has not been received since more than 10 years, the Consultant requested CAWSS to prepare the balance sheets for Kabul only, including the head offices.

The provisional income statement of the period 21/03/2002 to 20/03/2003, i.e. roughly 2002, indicates

Total costs	22.6 M new Afs	equivalent of	452,840 EUR
Revenue	3.0 M new Afs	equivalent of	60,000 EUR
Loss covered by subsidies	19.6 M new Afs	equivalent of	392,840 EUR

The tariffs prior to the increase as per June 2003 have been to the Consultant as follows:

- households at metered connections: 1Af/m3 = 0.02 EUR/m3
- households' flat rate for the general ½" connection 10 Afs/month = 0.20EUR/month

It is obvious that this tariff covers only a fraction of the operation costs and contradicts the Enterprise Law.

Transitional Islamic Government of Afghanistan
Ministry of Urban Development & Housing

kfw GROUP

CENTRAL AUTHORITY FOR WATER SUPPLY AND SANITATION (CAWSS)

Afghan-German Financial Cooperation

SUMMARY OF THE FEASIBILITY STUDY FOR THE EXTENSION OF THE KABUL WATER SUPPLY SYSTEM

presented by

Dipl.-Ing. Bernd Fischaess
Project Manager for
Joint Venture
RRI-BELLER and KOCKS CONSULT
Germany

The UFW is estimated to be around 60% in the current year, at the absence of comprehensive metering both at the consumers' and at the production side, no precise value can be given.

As a result of undervalued fixed assets, the income statement is distorted by an undervaluation of depreciation costs. Maintenance has obviously not taken place in 2002. Proper maintenance would cost in the range of 50 to 100 million Afs per year.

As stated under chapter 3, DIR, basic commercial functions are not being fulfilled. The present water tariff (see table below), though revised in June 2003, is by far insufficient for covering even the costs of operation and maintenance.

Until recently (April 2003), CAWSS was not able to cover its personnel costs, despite the low salary level of around 36 € per month per employee. It had to receive a Government subsidy for covering the deficit. This subsidy was in turn financed by international donor organisations.

3.3 A Strategy for Improvement

3.3.1 Options for system development

The main options for the evolution of CAWSS within the developing policy framework of increased democratisation, decentralisation, cost recovery and a desire for privatisation some time in the future are

- Delegation of CAWSS's responsibilities to Kabul City Municipality
- Corporatisation of CAWSS
- Privatisation of CAWSS
- Maintain the Status Quo, at least for the foreseeable future

These options have been analyzed in the DIR; as a result, for the time being, the last option is the most promising one.

The strongest argument for maintaining the status quo, at least for the time being, is the absence of enabling conditions at local levels of government, and the need to see privatisation as a long term goal only. As Afghanistan's political situation stabilises, becomes increasingly democratic and matures, responsibilities for urban services will naturally move closer to citizens at the local level. Local governments will then probably take on responsibility for providing urban services, and the justification for maintaining a centralised utility organisation like CAWSS would become increasingly illogical.

The continuation of CAWSS, in these terms should be seen as a transitional arrangement providing a bridge to decentralisation, and ultimately privatisation.

During this interim period CAWSS would continue to perform an important role. Indeed it will need to be strengthened, and organised in such a way that decentralisation of its activities at a later date is a routine affair as local levels of government become capable of taking on these additional responsibilities.

3.3.2 Project accompanying measures to improve CAWSS' performance

At the very beginning of the implementation period, in fact prior to any design, a project implementation task force (PITF) must be created that acts as PIA, Client and Employer towards the other participants in the project implementation. An international expert as technical assistant must be a permanent member of the PITF, preferably its chairman during the first two years.

In an early stage of the implementation period, the organisational structure of CAWSS must be transformed into the desirable and agreed structure; the structure must be filled gradually with staff that undergoes sufficient training prior to and during the employment. Therefore, training programmes of all kinds (plumbers, fitters, electricians, book-keepers, secretaries etc.) and language courses in English language for all managerial staff will have to continue permanently during project implementation. Together with the staff recruitment programme, a salary adjustment must take place to make work in CAWSS attractive to qualified staff and prevent staff from leaving CAWSS after having received training.

It is expected that the number of staff needed at the completion of the short term project amounts to 500 through 600 employees for the head office and the Kabul operations. Staff required in the provincial towns is not included in this figure.

Likewise, an upgrading program for the offices and workshops, car pools of CAWSS has to be implemented as a continuation of the measures already initiated by the IAP.

Table 4 Time-phased operation and maintenance costs: (in M EUR)

	2004	2005	2006	2007	2008	2009	2010
Personnel	0.18	0.22	0.41	0.61	0.80	1.00	1.50
Energy	0.91	0.91	1.00	1.13	1.34	1.68	1.63
Chemicals	0.24	0.24	0.26	0.30	0.35	0.44	0.43
Administration	0.18	0.22	0.41	0.61	0.80	1.00	1.50
Sum	**1.51**	**1.59**	**2.09**	**2.64**	**3.30**	**4.12**	**5.06**

4.1.3 Financial and economic analysis

Dynamic prime cost per cubic meter of water produced and distributed, at 5%pa and a 20 years' period of analysis amounts to

EUR 0.223/m3 of operation costs only and

EUR 0.587/m3 full costs

under consideration of a book value and an acquisition value of the existing works of 23.9 and 49.8 MEUR at the end of 2003, respectively on one hand and the implementation from 2011 to 2014 of a medium term project at investment costs of 363.1 MEUR.

The financial internal rate of return (FIRR) is marginal, viz.: 0.6% and at the same time corresponds to the economical one (EIRR).

The UFW is expected to drop from 45% in 2004 down to 20% in 2010 as a result of the new systems and the leakage detection and repairs carried out during this period.

Likewise, the bill collection ratio is expected to increase from 60% in 2004 up to 90% in 2010 as a result of the new systems and the awareness campaigns running throughout the implementation period.

4.1.4 Tariff proposed

The proposed water price for the normal domestic consumer, in Euro and Afghanis of 2003 conditions, is 0.33 Euro (17 Af) per m³, which is 8.5 times the present price (2 Af/m³, after doubling the previous price). At that price, an average 7.5 persons household will have a monthly water bill of 134 Afs p month. This amount can be paid by the majority, however not by the entire population.

The proposed average price level will be reached in steps until 2008. After that, it should be increased carefully, as the general income level goes up; an annual increase

of 0,5% p.a. has been supposed. It is also proposed that administrative and professional consumers pay double prices.

The proposed connection fees are 70 Euro (or US$) = 3,500 Af per household connection, as found agreeable by the socio-economic survey. This fee, too, will not cover the cost of a new house connection which is estimated to be 200 Euro.

4.1.5 Cash flow and financing pattern

The cash flow analysis is carried out for two alternative scenarios, viz.: (1) financing of project costs by grants; in that case, the utility must have recovered, at the end of the analysis period, the tariff proposed hereinabove allows this, and (2) financing of both projects by soft loans (grace period of 5 years, starting from the first year after project completion, equal annual repayments, interest rate 1% p.a., to be applied on the remaining debt).

The proposed tariff satisfies scenario (1) and the prerequisite, that at the end of the 20-years' period the accumulated cash must be equal to the accumulated depreciation of 190 MEUR.

To the contrary, the proposed tariff accumulates heavy deficits at the end of the 20-years's period, so that these deficits and the required replacement investments have to be financed by grants at that time. Over a 10-years's period such deficits do not show since they are mainly due to the costs of the medium term project.

Therefore, the investment costs of both the short term project and the medium term project (see table 8-4 above), increased by the 5% supplement for price contingencies, and should preferably be financed entirely by grants from the international donor community.

If this is not possible, the same amounts should be financed by long term loans by the same agencies, at soft conditions.

Since all of the investments are to finance with either grants or loans, the disbursement schedule corresponds to the schedule of investment costs and is given in the following table. (in M EUR)

Table 5 Disbursement schedule (in M EUR)

year	2004	2005	2006	2007	2008	Sum
total	0.87	17.46	37.28	28.90	15.97	100.48
% of total	0.9%	17.4%	37.1%	28.8%	15.9%	100.0%

5. Assessment of Project outputs, impacts and risks

5.1 Project outputs and their socio-economic and socio-cultural impacts

After implementation, the project is expected to have the following direct benefits:

(1) Supply of piped water via house connection to approx. 1.3 Mcap

(2) Supply of piped water via public tap to approx. 0.7 Mcap

The indirect benefit and project objective is the improvement of domestic hygiene in the corresponding number of households, the subsequent expected improvement of health because of the reduction of waterborne diseases and the relief particularly for the women usually charges with the care for sick family members.

During implementation the project will crate at least 2,000 jobs for skilled and unskilled labour and also provide on-the-job-training for this workforce.

Implementation of the project is also expected to give incentives to Afghan nationals to create business as sub-contractors etc. under the umbrellas of experienced international firms.

5.2 Environmental project impacts

No immediate negative environmental impact can be associated with the project. The Kole Hashmat Khan Waterfowl sanctuary is not directly affected by the project and subject to more pressure from the expansion process of the city and agriculture. Yet, this subject must be taken up by the future study of the Kabul River basin.

Withdrawal of the total of $44 Mm^3$ per year (= $1.4 m^3/s$) from the Kabul river affects the stretch in the gorge down to the confluence of the Panjsher. This withdrawal also affects power generation in the power stations downstream of Kabul; the loss may reach up to up to 44GWh/a. Both issues have to become subjects of future study of the Kabul River basin, the water supply to Kabul city being only one of the various users of the Kabul river.

5.3 Summary and assessment of project risks

5.3.1 The political risks

The inherent risk of the present Afghan political and social situation is the possible failure of the process of consolidation. As a consequence, consumer groups may fail to pay the water bills. Civil unrest and war as its worst consequence may lead to the destruction of works in progress or already completed.

In the earlier case, subsidies most likely from sources outside of the country and in the order of magnitude of costs of operation could keep the operation of the water supply system of Kabul going. The latter case would be a set-back into the nineties.

Mitigation measures to overcome these risks are beyond the means of the project.

5.3.2 Regional resource allocation

It is assumed that the re-established water administration will steer the water allocation process required to guarantee the water supply to the city of Kabul. Failing to achieve this may result in a future shortage of the resource.

5.3.3 Client's awareness and ability to pay

There is a risk that the consumers will not respond as assumed regarding the water use and payment of the water bills though the political and economical situation enables them to do so. Causes for such behaviour must be investigated at an early moment and appropriate mitigation measures be sought.

5.3.4 CAWSS's performance

It is assumed that CAWSS's performance beginning from now will progressively improve until the end of the implementation period and be maintained on the achieved high level. There is still a risk that the performance of CAWSS's cannot be upgraded to the required level. Causes for such failure must be investigated at an early moment and appropriate mitigation measures be sought.

5.3.5 Governmental and administrative environment

It is further assumed, that the reform of the water sector on the national and regional level will take place as anticipated. Failure to achieve such reform at an early stage of the implementation may result in queries on the availability of routes during design and construction and of the resources once the project comes into full operation. Causes for such failure must be investigated at an early moment and appropriate mitigation measures be sought.

Freiburg / Kabul, October 10th, 2003

Table 6 **Priority investment 'packages'**

	N°	Kind of activities of investment	'package' costs
	D-1	Design of: Standard documents, production and trunk only of: Logar I, Logar II, Allaudin; production only of Upper Kabul	3.70 M EUR
CONSTRUCTION, and design if not included in D-1			
	0-1	All well fields	9.69 M EUR
Logar I	1-1	pumping station	2.89 M EUR
	1-2	reservoir O, trunk #101,102 Rahman Mena Extensions	3.27 M EUR
	1-3	reservoir R, trunk #801 Pai-e-Mina 1	7.94 M EUR
	1-4	reservoir S, trunk #103 Erzan Qemat	5.41 M EUR
Logar II	2-2	pumping station, reservoir E, #7 Share-Naw	13.16 M EUR
	2-3	#10 Qale Fatullah, #13 Qal Obchakan, #14 Wazir Akbar Khan, #25,1 Parwan 3, #26 Wazir Abad, #27 Teomany	8.06 M EUR
	2-4	H trunk only E>H	3.35 M EUR
Allaudin	3-1	pumping station, trunk #15 Karte Se, #16 Karte Char reservoir A	3.36 M EUR
	3-2	reservoir D #4 Old City	3.77 M EUR
Upper Kabul	4-1	pumping station, trunk #105 Karte Char reservoir B	7.61 M EUR
	4-2	F, trunk and reservoir #20 Deh Naw, #104.2 Khoshal Mena	4.08 M EUR
	4-3	I, trunk and reservoir #912 Chelseton, Eastbank	2.14 M EUR
Afshar	5	pumping station #104.1 Khoshal Mena reservoir G, trunk #802 Extension West reservoir K, trunk #913 Family Hay Kharga	4.73 M EUR
Total	14	**priority ,packages'**	**83.16 M EUR**
Total		**low-priority unspecified**	**17.32 M EUR**
Total		**project**	**100.48 MEUR**

Table 7 Complementary 'packages'

	C-1	Consumers' awareness building 2005-2008	**4 M EUR**
	C-2	Consumers' premises improvement 2005-2008	**13 M EUR**
	C-3	Training of CAWSS's staff 2005-2008	**1.5 M EUR**
	C-4	Re-establishment of gauging stations 2005	**0.5 M EUR**
	C-5	New Microroyan WWTP, for 125,000 PE	**12 M EUR**
	C-6	Sanitary sewers in Central Kabul	**4 M EUR**
	C-7	MV power line from Logar to Upper Kabul	**0.3 M EUR**
	C-8	Power generation 10MVA for CAWSS	**4.5 M EUR**

CONTENTS

SUMMARY

0. The Contract

- The association of RRI BELLER Consulting Engineers and KOCKS Consult in co-operation with Stadtwerke Ettlingen, all of Germany, have been entrusted this Consulting Contract for establishing a Feasibility Study for the "EXTENSION OF THE KABUL WATER SUPPLY SYSTEM" ("Project") on December 18th, 2002. The Consultant currently carries out three other contracts in this sector in Afghanistan, viz.:
- Immediate Measures for Kabul Water Supply, financed by KfW
- Immediate Measures for Herat Water Supply, financed by KfW
- Consultancy services for the re-establishment and operation of water supply and sanitation services in selected provincial Towns, financed by WB

This study is divided into 3 main stages, viz:

- stage 1 - socio-economic and technical assessment and problem analysis
- stage 2 - possible options and concepts
- stage 3 – preliminary design and feasibility study

1. Presentation of the objective and justification of the Project

1.1 Sectoral background, local frame conditions, problems, project justification

The general background is characterized by the post-conflict situation under a transitional Government proceeded by the fall of the Taliban Government in late 2001. The main problems of this situation are the absence of infrastructure in all sectors, viz.:

- absence of a generally applicable and recognised constitution
- absence of a generally applicable and recognised legal system
- absence of an efficient and generally recognised administration
- absence of industrial employment and output
- large destroyed residential quarters in the city
- insufficient power generation and distribution
- insufficient water production and distribution
- detoriated road system
- etc.

It is expected that the basic political, administrative and legal frames will be accomplished within the next few years, with general elections in 2004 and subsequently the installation of a ordinary permanent Government and the introduction of a legislation that facilitates the recovery of the economy.

The sector background is characterised by the following:

Taking into consideration that up to 30,000 meters will be established at the end of IAP, which is the reference for the 'existing', and with an occupation of a plot at 16 cap., only

$$q_{spec} = 30{,}000hc/d/2{,}3Mhab = 20\% \text{ of Kabul population}$$

is connected to the piped water supply. The average day per capita consumption at the 50% losses production amounts to approx.

$$q_{spec} = 68{,}160m^3/d/2{,}3Mhab = 14l/cap/d \text{ with falling tendency.}$$

The total length of distribution network in Kabul being currently approx. 500km only results in an extremely low per capita length of network of

I_{spec} = 500km/2,3Mhab = 0,22m/cap with falling tendency.

Public taps and trucked water reach only a small portion of the remaining 80% of the population which has to rely on public hand pumps installed by various NGO's in the past years. However, the aquifer tapped by these wells is subject to increasing contamination by the infiltrated waste water and the seepage from excreta; on the other hand, many of the hand pumps provide paths of contamination by themselves.

All residential areas except for the blocks of flats (Microroyan, police blocks etc of a total population of approx. 130,000 cap) have on-site sanitation. Nearly all of the traditional dwellings which account for more that 80% of the residences discharge the grey sewage unto the public space wherefrom it evaporates or seeps into the ground and have the excreta removed as nightsoil. A small minority has on-site sewerage from full plumbing into a septic tank with cess-pools.

No technically suitable drainage system exists in Kabul.

1.2 Project targets

Apart from covering the basic needs for water of the population, the implementation of the project (in the following referred to as 'Short term Project') is expected to contribute to the stabilisation of the urban society and to the strengthening of the administration. Likewise the same result is expected from other projects aiming at strengthening of technical urban infrastructure (power, roads, sewerage), as well as the construction of new and the reconstruction of destroyed dwellings, as far as the construction sector is concerned.

The global target is the improvement of the general living and health conditions of the Kabul population which at the end of 2002 was at 1.9M cap and which is expected to reach 3.0Mcap and 3.5Mcap in 2005 and 2010, resp. The direct indicator for the achievement of the target is the index of waterborne diseases, which were reported from a random sample to make up for 38% of the consultations with a high proportion of acute bloody diarrhoea.

The general target is the extension of the Kabul water supply system and the access of a maximum of the inhabitants, if not of all, to the piped water as a replacement of the progressively deteriorating local ground water. The target indicators for the project are the achievement of the following:

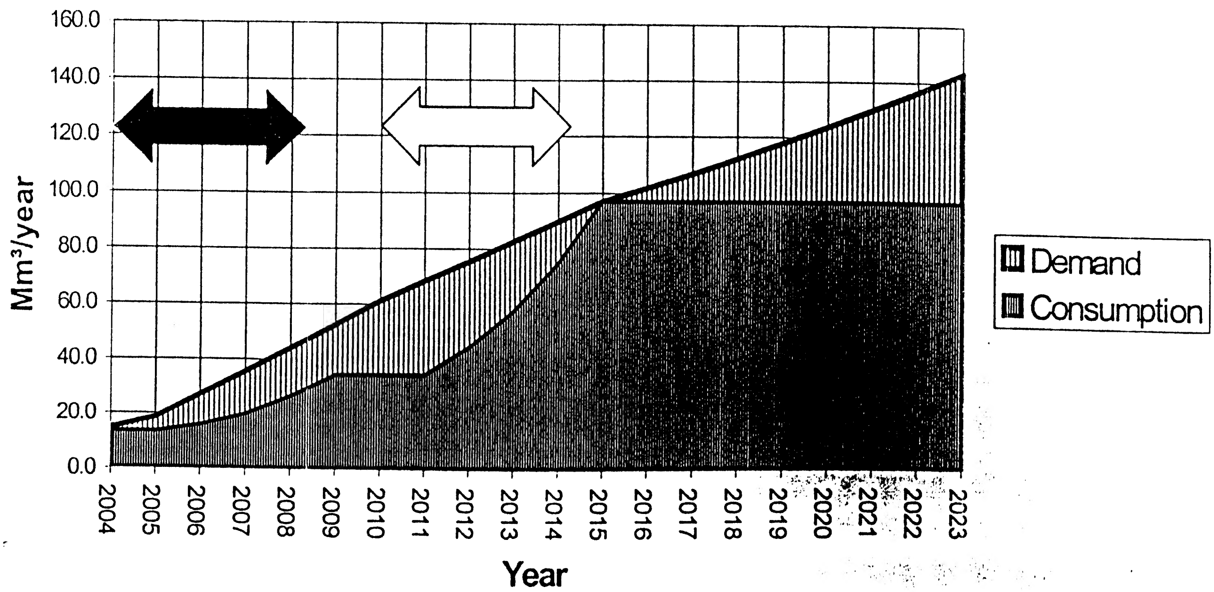
Table 1 General project target parameters

parameter	value	unit
distribution system length after reservoirs	1,600	km
house connections, working	111,000	pieces
public standpipes, working	440	pieces
water sold	34.4	M m³/a
water produced	44.4	M m³/a

This present project however, because of the limited local resources as explained under item 2.2 hereinafter, cannot cover the demand which evolves as shown in the graph overleaf. After completion of a medium term project in 2014, which is not the subject of this study, the demand will be covered only for one year, the year 2015 at a very modest overall average per capita consumption of 67 l /cap/d, thereafter, until the completion of a third investment project, a new deficit will emerge.

Figure 1 ***Evolution of demand and Consumption***

(Implementation of Short term project)
(Implementation of Medium term project)



1.3 Target groups

In the present situation, Kabul is an overcrowded city and not much of stratification can be materialised. A census is carried out at present, its results, when available, will hopefully give an enhanced picture on the relevant parameters of the Kabul population. The Consultant has carried out a quite limited household survey which has given rather tendencies than statistical figures.

Regarding the poverty issue, acc. to the Consultant's survey, quarters have been found and marked on drawing n° 1.2 where an increase of the water tariff is more bearable than in others. This is a 50/50 ratio but on the low level of 100 Afs per household. The gender issue does not materialise as it may be elsewhere: water fetching is not a women's duty in Kabul, and in any case the availability of clean water and the reduction of waterborne diseases will diminish the burden on the women.

Regarding the restricted coverage of the demand, the quarters selected to be serviced under the project comprise (1) those already having a distribution network but an insufficient resource, (2) those consolidated quarters where the construction of a network is pending since many years, in fact those earmarked already in the PRIL 1974 Master plan, and (3) new extensions already developed or where the development is imminent. In all 3 cases however under considerations of the ability to pay a technically and economically reasonable overall system layout.

2. Presentation of the Project measures

2.1 Presentation of links and interrelation projects and activities

This present project is interrelated with the following projects and activities:

Table 2 **Interrelated projects and activities** (to be completed)

	donor	project/activity	funds allocated
1	WB	Sanitation Improvements in Kabul City	
2	UN Habitat		
3	GTZ	Water Sector Reform	
4	CARE		
5	ACE	Sanitary programs in Kabul	
6	AGEF	Training of skilled labour	
7	ICRC	WATHAB projects	
8	JICA	Rehabilitation Study for the South-Western Area & Public Transportation Study of Kabul	
9	NCA	Capacity building at CAWSS	

to be completed on the workshop

The following Governmental agencies are involved under the current allocation of competencies:

- Ministry of Urban Planning and Housing
- Ministry of Irrigation, Water Resources and Environment
- Ministry of Mining
- Ministry of Water Power
- Municipality of Kabul

2.2 Project strategies

The project is conceived as a first phase of a medium term concept. The phasing is determined by the resources and the short term project therefore is based on the capacity of the 'readily available local resources'. The remaining beyond this scope resources still need further investigations and must be seen in the regional context of the Kabul River catchments area. (Update of the 1980 MONENCO study). In fact, the combined yield of these 'readily available local' resources is 44 Mm3/a or 121,000m3/average day. This amount is by far less than the calculated 2010 demand of 167,000m3/average day which is based on a 50l/cap/d only for the residential demand in an served plot, before deduction is made for water expected to be fetched still from the private well.

The planning horizon for the short term project is therefore identical with the implementation horizon, which is set at the end of 2008 thus allowing a 5 years' implementation period. This period is adequate for a project of a total investment cost of 100 MEUR.

The principal medium term resources, subject to proof in the a.m. FS, are the Logar River with the required storage capacity and the Panjsher River. However, both resources will require much more investment and operation cost as the 'readily available and local' resources under the short term project and thus cause a substantial increase in the tariffs when implemented.

2.3 Proposed Project measures

2.3.1 Resources

The resources now in use and those serving the project are identical. These are all aquifers recharged by the rivers of the area: the Logar river, the Kabul river and the Paghman river, in the sequence of importance. No surface water is now used nor is it foreseen in the project. These aquifers are situated in two intramontanous basins; this report follows the partition chosen by Homilius (1967 and the succeeding authors, viz.:

Upper Kabul Basin with:

Upper Kabul River aquifer (UKRA)

Paghman (and Kharga) River aquifer

Lower Kabul Basin with: